Name:

at1124exam: Radicals and Squares (v828)

Question 1

Simplify the radical expressions.

$\sqrt{8}$	$\sqrt{12}$	$\sqrt{27}$
$\sqrt{2 \cdot 2 \cdot 2}$	$\sqrt{2 \cdot 2 \cdot 3}$	$\sqrt{3 \cdot 3 \cdot 3}$
$2\sqrt{2}$	$2\sqrt{3}$	$3\sqrt{3}$

Question 2

Find all solutions to the equation below:

$$3(x-4)^2 + 9 \;=\; 84$$

First, subtract 9 from both sides.

$$3(x-4)^2 = 75$$

Then, divide both sides by 3.

$$(x-4)^2 = 25$$

Undo the squaring. Remember the plus-minus symbol.

$$x - 4 = \pm 5$$

Add 4 to both sides.

$$x = 4 \pm 5$$

So the two solutions are $x = 9$ and $x = -1$.

Question 3

By completing the square, find both solutions to the given equation. *You must show work for full credit!*

$$x^2 + 14x = 95$$

$$x^2 + 14x + 49 = 95 + 49$$
$$x^2 + 14x + 49 = 144$$
$$(x + 7)^2 = 144$$
$$x + 7 = \pm 12$$
$$x = -7 \pm 12$$
$$x = 5 \quad \text{or} \quad x = -19$$

Question 4

A quadratic polynomial function is shown below in standard form.

$$y = 4x^2 - 24x + 41$$

Express the function in **vertex form** and identify the **location** of the vertex.

From the first two terms, factor out 4 .

$$y = 4(x^2 - 6x) + 41$$

We want a perfect square. Halve -6 and square the result to get 9 . Add and subtract that value inside the parentheses.

$$y = 4(x^2 - 6x + 9 - 9) + 41$$

Factor the perfect-square trinomial.

$$y = 4((x - 3)^2 - 9) + 41$$

Distribute the 4.

$$y = 4(x - 3)^2 - 36 + 41$$

Combine the constants to get **vertex form**:

$$y = 4(x - 3)^2 + 5$$

The vertex is at point $(3, 5)$.